AERIAL SURVEY OF PEARY CARIBOU ON BANKS ISLAND, NWT, SEPTEMBER 1990.

Northwest Territories Renewable Resources

103-06956/

AERIAL SURVEY OF PEARY CARIBOU ON BANKS ISLAND, NWT, SEPTEMBER 1990.

BRUCE D. McLEAN[1]

PAUL FRASER[1]

ANNE GUNN[2]

DEPARTMENT OF RENEWABLE RESOURCES

GOVERNMENT OF THE NORTHWEST TERRITORIES

1 - INUVIK, NWT

2 - COPPERMINE, NWT

1992

Manuscript Report No. 62

THE CONTENTS OF THIS PAPER ARE THE SOLE RESPONSIBILITY OF THE AUTHORS

ABSTRACT

An aerial survey for caribou on Banks Island was flown 14 -19 September 1990. The survey was designed to document fall numbers and distribution in response to a request by the Wildlife Management Advisory Council (WMAC). The survey was flown using a strip transect design with approximately 5% of the island covered. A total of 26 non-calves and 3 calves were observed on transect, giving a population estimate of 500 $\pm$ 300 (SE of estimate) caribou, with a CV of 0.57. An additional 38 non-calves and 5 calves were observed off transect. In some years the majority of caribou move to the southwest part of the island for the winter. We found one area on the southwest part of the island where caribou were concentrated. Otherwise no pattern of distribution could be discerned. That area was reflown at 20% coverage. A total of 12 non-calves and 4 calves were observed on transect; 7 non-calves were observed off transect. This additional effort did not change the population estimate or improve the precision of the estimate. Calves comprised 11% of all caribou observed. Fog, rain, and snow interrupted some flight lines making survey conditions difficult. We do not recommend repeating such a survey at this time of year. Although the precision of this survey is poor we suggest that the decline in numbers has continued and the population has reached a seriously low level. We recommend that hunters be advised to reduce their subsistence hunting and that the whole island be surveyed in June 1991 using the same methods as the 1989 survey.

TABLE OF CONTENTS

ABSTRACT iii

LIST OF FIGURES vii

LIST OF TABLES ix

INTRODUCTION 1

METHODS 2

RESULTS 5

DISCUSSION 8

RECOMMENDATIONS 12

ACKNOWLEDGEMENTS 13

PERSONAL COMMUNICATIONS 14

LITERATURE CITED 15

Appendix A. 16

Appendix B 17

LIST OF FIGURES

Figure 1. Transect lines flown for caribou on Banks Island, NWT, September 1990 3

Figure 2. Estimate of caribou (excluding calves) on Banks Island, NWT 10

LIST OF TABLES

Table 1. Estimated numbers of caribou (non-calves), by stratum, on Banks Island, NWT, September 1990. 6

INTRODUCTION

The caribou population on Banks Island has declined during the 1980's (McLean and Fraser in prep.). The June 1989 population estimate of 2600 ± 330 (SE of estimate) non-calf caribou (McLean and Fraser in prep.) was considerably lower than that of 9000 reported in 1973 (Urquhart 1973). Historical and local information suggests that the caribou concentrate in the southwest part of the island during the fall (Urquhart 1973, Usher 1971, McEwen 1955). The Sachs Harbour Hunters' and Trappers' Committee (HTC) felt that caribou may have been missed in the June surveys and that a fall survey of southwest Banks Island would confirm the size of the population. The Wildlife Management Advisory Council (WMAC) recommended that a fall population survey be conducted in 1990. We originally planned to survey only the southwest part of the island, however we felt that the survey area should be expanded to the whole island in case the caribou had not yet moved south. A whole island survey would also give us better information on distribution.

Previous caribou population surveys were conducted in late June to early July when caribou are more visible because their white pelage contrasts with a dark background (Latour 1985, McLean et al. 1986, McLean in prep., McLean and Fraser in prep.). The sightability of caribou is seasonally variable as pelage and background change, limiting comparisons of data obtained during different seasons.

METHODS

Aerial survey methods were similar to those used on Banks Island in 1987 and 1989 (McLean in prep., McLean and Fraser in prep.). The island was divided into 4 strata of approximately equal area. Transect lines, aligned perpendicular to the major river drainages, were spaced 20 km apart to provide 5% coverage (Figure 1). Any area of caribou concentration was delineated subjectively from the initial 4 strata and reflown at approximately 20% coverage.

The survey aircraft were a Cessna 180 (regular gear) and a Helio-Courier (on tundra tires) equipped with STOL kit (short takeoff and landing). Strip width was 0.5 km on each side of the aircraft for a total transect width of 1.0 km. The strip width was marked using wooden dowels taped to the wing struts (C180) or a tape marker on a wire stretched between the tie-down rings and the fuselage (Helio-Courier) using the formula: $w = W \times h/H$, where w is the calculated strip width on the ground, W is the chosen survey strip width, h is the height of the observer on the ground, and H is the chosen survey altitude (Norton-Griffiths 1978). The strip markers were then checked against a known distance on the runway at Sachs Harbour and adjusted accordingly during several passes of each aircraft at survey altitude. The survey was flown at an altitude of 120 m above ground level (agl) at an air speed of about 160 kph in the C-180 and 140 kph in the Helio-Courier.

The Cessna 180 survey team included a pilot, two primary

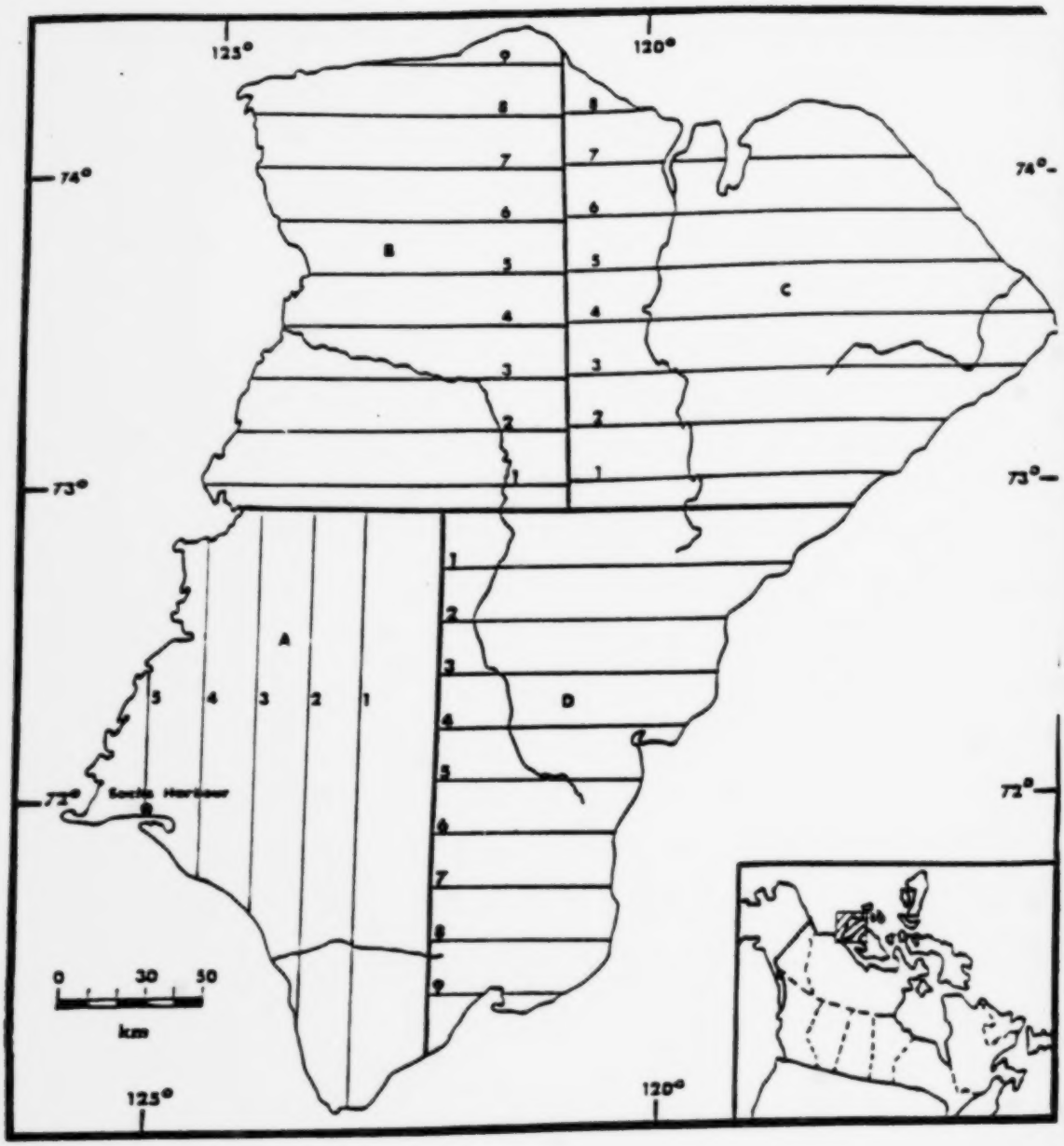

Figure 1. Transect lines and strata boundaries used during the caribou survey on Banks Island, NWT., September 1990

observers located in the rear left and right seats, and a recorder/observer seated in the right front seat. In the Helio-Courier we used a pilot and two rear observers. The right rear observer also recorded the data. The pilot navigated and marked the location of animals on 1:250,000 scale topographical maps. The two primary observers continuously searched for and counted caribou older than calves observed on transect. Caribou were classified as non-calves, large bulls or calves. If any part of a group was within the transect then the whole group was counted as being in. The primary observers transmitted data to the recorder using a Telonics 4-way intercom system. The recorder/observer recorded information on data sheets and also assisted the right rear observer by searching for animals (C-180).

Transect data were transcribed daily onto summary sheets. Descriptive statistics were calculated on an Apple IIc computer using a Renewable Resources census data program based on Jolly (1969), method 2 for unequal sample sizes. Survey areas were calculated using a polar planimeter.

RESULTS

A total of 26 non-calf and 3 calf caribou were observed on transect, giving a population estimate of 500 ± 300 (SE of estimate) for the island (Table 1). The coefficient of variation (C.V.) was 0.57. An additional 38 non-calf and 5 calf caribou were observed off transect (Appendix A). The majority of caribou were found in the southwest part of the island. This area was reflown at 20% coverage. A total of 12 non-calf and 4 calf caribou were observed on transect; 7 non-calves were observed off transect. This additional effort did not change the population estimate or improve the precision of the estimate. Eleven percent of all caribou observed were calves (n=64). Mean group size of non-calves, including all observations was 4.36 ± 2.94 (range: 1-13, n=22).

The aircraft were based in Sachs Harbour and Castel Bay during the survey. Approximately 35 h were flown between 14-18 September 1990 to obtain 5% coverage of the whole island. On 19 September an additional 4 h were flown in the southwest part of the island where the majority of caribou had been located. A total of 65 hrs of fixed-wing time was required to complete the survey (including ferry, Appendix A).

Weather and snow conditions were generally poor during the survey. Snow covered approximately 50% of the area on the south half and 70 - 100% on the north half of the island. The snow cover was frequently mottled which made the caribou inconspicuous.

Table 1. Estimated numbers of caribou (non-calves), by stratum, on Banks Island, NWT, September 1990.

Stratum	Density (caribou/km^2)	Pop. Est. (± S.E.)	Coefficient of Variation	Coverage (%) [a]
A	.02	293 ± 286	.98	5.0
B	.01	187 ± 91	.49	5.0
C	0	22 ± 19	.86	5.0
D	0	24 ± 20	.83	5.0
Total		526 302	.57	

[a] Based on n/N, proportion of possible transects.

Snow was present at higher elevations on all portions of the island. Flights over some survey lines were interrupted by ground fog and snow/sleet on 15, 16 and 19 September.

DISCUSSION

The Sachs Harbour HTC felt that a survey conducted on winter ranges would provide a population estimate that was more reliable than those obtained during spring surveys. As a result, the WMAC and Sachs HTC requested that DRR conduct a fall survey of the SW portion of the island. Because the timing and the area to which caribou migrate in the fall varies from year to year (Latour 1982 unpubl., Urquhart 1973), and because they do not always winter close to Sachs Harbour (Latour 1982 unpubl., Peter Esau pers. comm.), we surveyed the whole island to ensure that no major aggregations of animals would be missed.

We were unable to detect large aggregations of caribou on the island during the survey. In areas where caribou were located, they occurred in low densities. The Coefficient of Variation (CV) on the population estimate of 0.57 was poor, and indicates that if the survey was repeated, we would obtain a population estimate between 0 and 800 caribou 90% of the time. As a result, we have a low level of confidence in the population estimate. In comparison, the CV on the spring 1989 population survey was 0.13 (McLean and Fraser in prep.), while the desired standard for caribou surveys in the NWT is 0.10 (Heard 1985).

A number of factors may have contributed to the poor survey results. First, weather, snow and light conditions were not ideal during the survey. Flights along some lines were interrupted by fog, sleet, and snow. The snow cover was mottled in some areas

making the caribou, in fall pelage, inconspicuous. The flat lighting conditions made for poor contrast during all but 2 days of the survey. Second, some animals may have been missed in spite of the fact that 3 of the 4 observers were experienced, having participated in the June 1989 survey. Animals are undercounted on all surveys, but it is impossible to measure the extent to which they are undercounted. Third, the survey was conducted at a low level of coverage (5%), with survey lines spaced at an interval of 20 km. During previous surveys when population levels were much higher, a 5% coverage was sufficient to locate areas where caribou were concentrated. If the population has declined further from levels observed in June 1989, the survey coverage of 5% may have been insufficient to obtain a reliable population estimate. Fourth, the caribou may have been dispersed in small groups as the largest group observed was comprised of 13 animals. If the caribou were dispersed in small groups, some animals may have been missed due to the survey design.

Areas where caribou were located were reflown at a coverage of 20% but this additional effort did not change the population estimate or improve the level of precision. As a result, poor viewing conditions, observer bias and survey design could not account for the low estimate. Although the fall population estimate obtained cannot be compared directly with those obtained during past spring surveys (Figure 2), the general trend suggests that the decline in numbers has continued. Therefore we must, in the interests of conservation, assume the population is at a

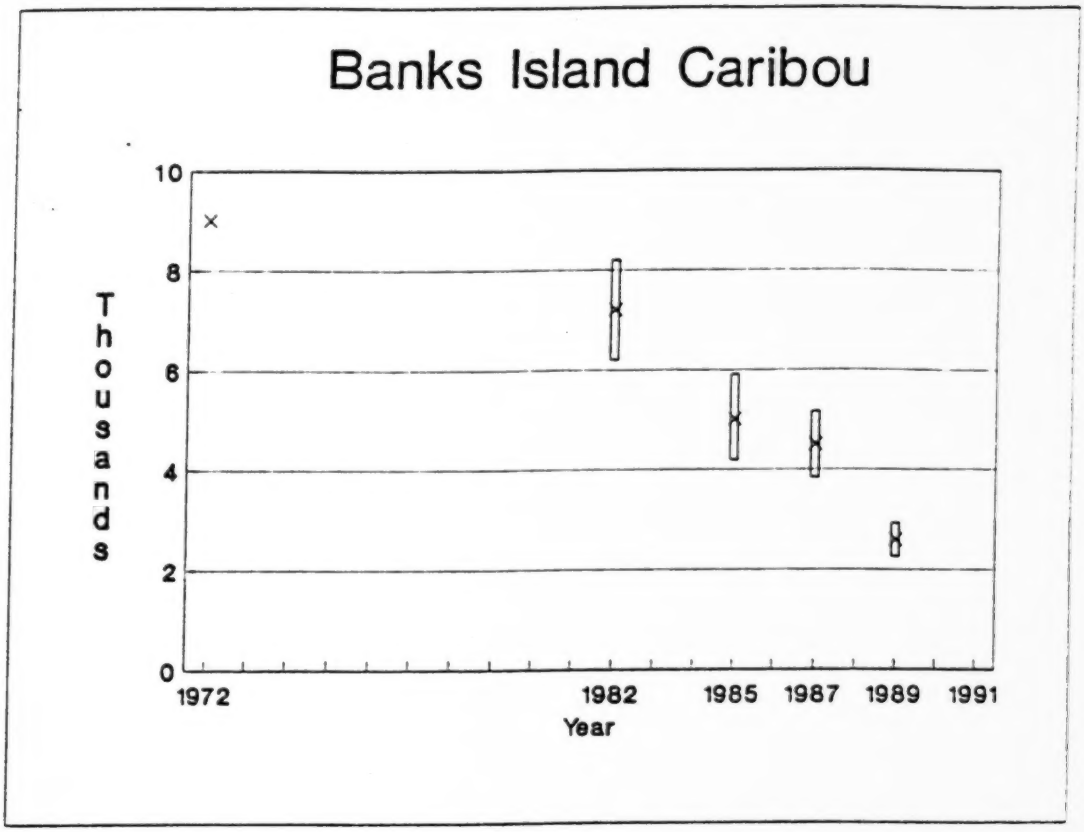

Figure 2. Estimate ± S.E. of caribou (excluding calves) on Banks Island, NWT.

1972 Urquhart (1973)
1982 Latour (1986)
1985 McLean et al (1986)
1987 McLean (1990)
1989 McLean and Fraser (1990)

critically low level.

Possible factors causing the decline of the caribou population include widespread winter mortality during certain recent winters, especially 1988-89, (McLean and Fraser in prep.). Hunting and predation may have become more significant factors as the caribou population declined. Wolf (Canis lupus arctos) numbers were considered low in the 1970's and 1980's, and wolf control as a management tool is unfeasable and probably not appropriate for that distinct subspecies found in low numbers only on the arctic islands. The only practical management option is to reduce the current subsistence harvest. The Sachs Harbour HTC has been requested to voluntarily reduce their annual caribou harvest.

RECOMMENDATIONS

1) Working together with the WMAC and the Sachs Harbour HTC the subsistence harvest should be reduced.
2) Renewable Resources should conduct a whole island survey for caribou in June 1991. We feel that survey conditions are better in June/July because of safety (longer days, less icing of aircraft), better sightability of animals (contrast better, sun higher), and the results are comparable with our previous trend surveys.
3) Work with the Sachs HTC, WMAC, and the Peary Caribou Recovery Team to plan how to help the population recover.
4) Research should continue to try to understand the factors causing the decline.

Editorial note: a whole island survey was conducted in late June 1991. Results are presented as a departmental manuscript report.

ACKNOWLEDGEMENTS

Funding to conduct the September 1990 aerial survey of Banks Island was made available from Renewable Resources headquarters and through the Inuvik District under the terms of the Inuvialuit Final Agreement.

The authors would like to thank Charlie Hoagak and John John Lucas of Sachs Harbour for being observers on the survey.

Karl Falseness (Inuvik Air Charters) and Perry Linton (NorthWright Air) safely flew the survey for us despite poor weather conditions.

Thanks to John Nagy for reviewing the manuscript and Kim Embleton for the word processing.

PERSONAL COMMUNICATIONS

Peter Esau, Hunters' and Trappers' Committee, Sachs Harbour, NWT.

LITERATURE CITED

Heard, D.C. 1985. Caribou census methods used in the Northwest Territories. In Proceedings of the Second North American Caribou Workshop: 229 - 238.

Jolly, G.M. 1969. Sampling methods for aerial censuses of wildlife populations. E. Afr. Agric. For. J. 34: 46-49.

Latour, P. 1985. Population estimates for Peary caribou and muskoxen on Banks Island in 1982. NWT Wildl. Serv. File Rep. No. 49. 21 pp.

McEwen, E.H. 1955. A biological survey of the west coast of Banks Island, 1955. Unpubl. ms., Can. Wildl. Serv., Aklavik, NWT. 55 pp.

McLean, B.D. In prep. Abundance and distribution of caribou on Banks Island, NWT., July 1987. NWT Dept. of Ren. Res. File Rep. No. 95.

McLean, B.D. and P. Fraser. In prep. Abundance and distribution of caribou and muskoxen on Banks Island, NWT., July 1989. NWT Dept. of Ren. Res. File Rep. No. 106.

McLean, B.D., K. Jingfors, and R. Case. 1986. Abundance and distribution of muskoxen and caribou on Banks Island, July 1985. NWT Dept. of Ren. Res. File Rep. No. 64. 45 pp.

Norton-Griffiths, M. 1987. Counting animals. Serenget. Ecological Monitoring Programme Handbook No. 1. Afr. Wildl. Leadership Found. Nairobi, Kenya. 110 pp.

Urquhart, D.R. 1973. Oil exploration and Banks Island Wildlife. NWT Wildl. Serv. unpubl. rep. 105 pp.

Usher, P.J. 1971. The Bankslanders: economy and ecology of a frontier trapping community. Vol. 1. Northern Science and Research Group, Dept. of Indian Affairs and Northern Development. NSRG 71-1.

Appendix A. Survey schedule and costs, Banks Island, NWT., September 1990.

Date	Location	Hours Flown	Weather
14/09	HDT Holman-Sachs	2.5 (ferry)	
	Sachs-Castels	1.0 (ferry)	fog - back to Sachs
	SLA Inuvik-Sachs	9.0 (ferry)	
15/09	HDT Sachs-Castel	2.0 (ferry)	
	SLA stratum A	4.0	-5^0C, 100% overcast, rain, some snow on high ground
16/09	HDT stratum C	7.5	-10^0C, CAVU, 100% snow cover
17/09	HDT stratum B	9.9	-6^0C, CAVU, 100% snow cover, ground fog on lines 8B, 9B
	SLA stratum A	3.0	-4^0C, 100% overcast
	stratum D	5.2	-4^0C, 100% overcast, some fog on 5D
18/09	HDT Castel-Sachs	2.1 (ferry)	
19/09	HDT stratum D	3.0	-9^0C, 100% overcast, snow showers
	SLA stratum A (20%)	4.0	-9^0C, 100% overcast, rain, snow flurries
20/09	HDT stratum D + ferry Holman	4.0	
	SLA Sachs-Inuvik	8.7 (ferry)	
	TOTAL	65.9	

Costs: (x $1000)	Air charters	18.9
	Fuel	3.4
	Barge	1.0
	Accommodation	4.2
	Casual	1.05
	TOTAL	28.55

HDT - call sign for Helio-Courier
SLA - call sign for Cessna 185

Appendix B. Number of caribou observed on transect on Banks Island, NWT, September 1990.

Str	Trans. Line	Area (km^2)	Left Observer	Right Observer	Total
A	1	212.5	0	0	0
	2	187.5	0	3	3
	3	145.0	0	0	0
	4	121.5	5	8	13
	5	59.5	0	0	0
subtotal		726.0	5	11	16

Str	Trans. Line	Area (km^2)	Left Observer	Right Observer	Total
B	1	112.5	0	0	0
	2	103.5	2	3	5
	3	97.5	0	0	0
	4	85.0	0	0	0
	5	77.5	0	0	0
	6	91.25	0	0	0
	7	96.25	0	3	3
subtotal		663.50	2	6	8

Str	Trans. Line	Area (km^2)	Left Observer	Right Observer	Total
C	1	126.75	0	0	0
	2	152.5	0	0	0
	3	177.5	0	0	0
	4	168.75	1	0	1
	5	150.0	0	0	0
	6	127.5	0	0	0
	7	102.0	0	0	0
	8	15.0	0	0	0
subtotal		1020.0	1	0	1

Appendix B. Number of caribou observed on transect on Banks Island, NWT, September 1990 (cont'd).

Str	Trans. Line	Area (km^2)	Left Observer	Right Observer	Total
D	1	135.0	0	1	1
	2	112.5	0	0	0
	3	108.75	0	0	0
	4	98.75	0	0	0
	5	80.0	0	0	0
	6	71.25	0	0	0
	7	72.5	0	0	0
	8	72.5	0	0	0
	9	37.5	0	0	0
subtotal		788.75	0	1	1

Str	Trans. Line	Area (km^2)	Left Observer	Right Observer	Total
A-1	1A1	40.0	0	0	0
	2A1	43.75	3	0	3
	2A2	47.5	0	0	0
	2A3	46.25	0	0	0
	3A1	48.75	0	0	0
	3A2	51.25	0	0	0
	3A3	47.5	0	4	4
	3A4	50.0	0	5	5
subtotal		375.0	3	9	12